

## REMARKS

Applicant respectfully requests reconsideration of the claims of this application in light of the amendments and remarks presented herein. Claims 1-28 are pending.

Claims 1 and 14, the only independent claims, have been amended to clarify that the present invention is a "process for concurrently drying, roasting, and grinding green coffee beans in a single unit operation," in which green coffee beans are introduced into an enclosure and entrained in the heated air spiraling downward through the enclosure, "wherein at least a portion of the green coffee beans are concurrently dried, roasted to induce pyrolysis, and ground in a single unit operation before reaching the lower end" of the enclosure. Support for this amendment can be found throughout the specification, for example, page 1, lines 9-10; page 2, lines 19-25; page 3, lines 3-12; page 3, line 23, through page 4, line 8; page 4, line 10; and page 7, lines 8-24.

Also included in this response, and incorporated by reference herein, is the Declaration of Vijay K. Arora ("Arora Decl."), which was originally submitted on November 14, 2007. Throughout the Declaration, Mr. Arora refers to the claimed process as a "single step" process, which was in line with the claim amendments submitted on November 14, 2007 but not entered. Applicants will gladly submit an amended declaration referring to claimed invention as presently amended at the Examiner's request. However, Applicants note that the phrases "single stage" and "single step" and the phrase "a process for concurrently drying, roasting, and grinding green coffee beans in a single unit operation," are all used to refer to the same thing, that is, a process in which green coffee beans are introduced into an enclosure and entrained in the heated air spiraling downward through the enclosure, and at least a portion of the green coffee beans are concurrently dried, roasted, and ground in a single unit operation before reaching the lower end of the enclosure.

## THE INVENTION

The Applicants reiterate that they have not invented, and are not intending to claim, a vortex grinding apparatus or machines or general methods of using such systems as described in Polifka (U.S. Patent Publication 2002/0027173). Rather, the present invention is related to a process for **concurrently drying, roasting, and grinding green coffee beans in a single unit operation**. Importantly, in accordance

with the present invention, green coffee beans are introduced into an enclosure and concurrently **dried, roasted to induce pyrolysis, and ground** in a single unit operation before reaching the lower end of the enclosure to produce commercially satisfactory coffee products. As noted in the Applicants' specification, this provides a number of significant advantages in the production of coffee as compared to the conventional commercial coffee preparation process which includes separate roasting and grinding steps in separate equipment. See Specification, page 3, line 22, through page 4, line 8.

### **REJECTION UNDER 35 U.S.C. §112**

Claims 1-28 have been rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention. The Examiner asserts that the limitation single stage "can encompass multiple steps and thus is unclear as to how the elements of the process claims are defined within the phrase 'single stage.'" The Examiner further asserts that the limitation of claims 11 and 24 of "re-introducing coffee beans in the solid particulate product having particle sizes as large as or more than the predetermined size into the upper enclosure" contradicts the "single stage" limitation "since re-introduction into the upper enclosure could be considered a different stage of the treatment process."

Although the Applicants respectfully disagree with this rejection, in order to advance prosecution, claims 1 and 14 have been amended to recite "a process for concurrently drying, roasting, and grinding green coffee beans in a single unit operation," in which green coffee beans are introduced into an enclosure, and "the green coffee beans are concurrently dried, roasted to induce pyrolysis, and ground in a single unit operation before reaching a lower end" of the enclosure. Support for this amendment can be found throughout the specification, for example, on page 2 line 32 to page 3, line 12 and page 7, lines 8-24. Applicants note that "roasting" refers to "heating a fruit bean sufficient to induce pyrolysis." Specification, page 4, line 10. The claims have also been amended to clarify the claim term roasting.

Applicants submit that the foregoing amendment overcomes the indefiniteness rejection. With respect to claims 1 and 14, the claims do not refer to a single stage or single step process, but instead, now specify that the green coffee beans are introduced into an enclosure, and "at least a portion of the green coffee beans are concurrently dried, roasted to induce pyrolysis, and ground in a single unit operation before reaching a lower end" of the enclosure. Having removed the "single-stage" language from independent claims 1 and 14, Applicants submit that the additional limitation of claims 11 and 24, which require "re-introducing coffee beans in the solid particulate product having particle sizes as large as or more than the predetermined size into the upper enclosure" does not contradict the limitations of the independent claims.

In view of the above, Applicants respectfully submit that pending claims 1-28 are in condition for allowance. Therefore, Applicants respectfully request that this case be passed to issuance.

### **REJECTIONS UNDER 35 U.S.C. §103**

The Examiner has reasserted a number of related rejections under 35 U.S.C. §103. As detailed below, the Applicants respectfully submit that the Examiner has erred substantively as to the requisite factual findings of *Graham v. John Deere Co.*, 383 U.S. 1 (1966) and, therefore, request that these rejections be withdrawn.

**Rejection 1** – Claims 1, 5-10, 13-14, 18-23, 25 and 27-28 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Polifka (U.S. Patent Publication 2002/0027173) as cited in the Office Action dated October 4, 2006. As noted above, the claims have been amended to require "a process for concurrently drying, roasting, and grinding green coffee beans in a single unit operation," in which green coffee beans are introduced into an enclosure, and "at least a portion of the green coffee beans are concurrently dried, roasted to induce pyrolysis, and ground in a single unit operation before reaching a lower end" of the enclosure.

As indicated by the Examiner, Polifka provides a vortex grinding system which is taught to be useful for drying and grinding a large variety of materials, including

agricultural products. The Examiner asserts that “Polifka teaches that agricultural products include all types of grains that can be ground into a flour and dried in the same operation and herbs can be ground into a fine powder” and, thus, concludes that it would have been obvious to the ordinarily skilled artisan that “the coffee bean is an agricultural product and is furthermore an agricultural product that has been well known to be heated, dried and milled” and that “it would have been obvious to one having ordinary skill in the art to use the device and process of Polifka to dry, roast, and grind coffee.”

Applicants respectfully suggest that this argument is both circular and involves hindsight reconstruction of the invention. The Examiner has effectively concluded that since someone (i.e., the Applicants) have shown that the device of Polifka is capable of doing something, that it would be obvious to one of ordinary skill in the art to do so. The Examiner is effectively arguing that because it does work (as shown by the Applicants), it is obvious. That is not the appropriate standard under 35 U.S.C. §103.

Applicants do not dispute that one of ordinary skill in the art might expect that coffee could be **dried and ground** in a vortex grinding apparatus such as described in Polifka. However, as set forth in the Declaration of Vijay K. Arora under 37 C.F.R. §1.132, and discussed in further detail below, for a number of reasons, one of ordinary skill in the art would **not** reasonably expect that the use of an apparatus such as described in Polifka with green coffee beans would provide a dried ground coffee powder that is concurrently **roasted to induce pyrolysis** such that it is comparable with green coffee beans roasted and ground using conventional methods. Indeed, the present invention is **unexpected and surprising** in light of conventional teachings in the art of roasting and grinding coffee beans.

First, it is well known in the art that, in conventional methods, coffee is prepared using the two separate and critical steps of: (1) roasting the whole green beans to a desired roast color for flavor and aroma generation; and (2) grinding the roasted whole beans into smaller size particles to accelerate release or extraction of coffee flavors, aromas and soluble solids during the brewing operation. Second, the roasting step is known in the art to be quite different and significantly more complex than merely drying

agricultural products using a conventional dryer or a vortex grinding apparatus such as described in Polifka. See Arora Decl. ¶ 7.

For centuries, green coffee beans have been roasted as whole beans to ensure desired flavor, aroma and color development. Roasting is a time-temperature dependent process, whereby a number of **chemical and physical** changes are induced in the green coffee beans, including: (1) removal of moisture from the green coffee beans; (2) a sharp rise in bean temperature due to exothermic reactions; (3) initiation of Maillard reactions and pyrolysis for flavor, aroma and CO<sub>2</sub> gas generation; and (4) expansion of the coffee beans (density reduction). In conventional methods using continuous roasters, whole green beans must generally be roasted at a temperature above about 550 °F for at least about 2 minutes. See Arora Decl. ¶ 8.

Moreover, attempts to first grind the whole green beans and then roast have been unsuccessful due to several factors, including: (1) mechanical difficulties in the grinding and handling of green coffee beans, which have a moisture content in the range of about 8% to 14% by weight depending upon the type of beans, results in the green beans being distorted and turned to mush during grinding; (2) the ground mush is difficult to fluidize in the roaster, which results in a brown mass with burnt specs due to non-uniform heat transfer in the roasting chamber; and (3) the lack of Maillard reactions necessary for flavor and aroma generation during roasting operation. See Arora Decl. ¶ 9.

Given this knowledge of the art, it was surprising and entirely unexpected for the Applicants to discover that the process of the present invention overcomes these problems and allows whole green coffee beans to be concurrently dried, roasted, and ground in a single unit operation, and yet, provides a coffee product that is comparable with coffee that is roasted and ground using conventional methods. Indeed, despite the commercial advantages of a system capable of providing ground roasted coffee in fewer process steps and with less equipment requirements than conventional methods, that need had been unsolved prior to the present Applicants' work. See Arora Decl. ¶ 10.

Also surprising and unexpected was the Applicants' discovery that the present invention could provide a roasted and ground coffee product at a significantly lower temperature and time exposure than required in conventional methods. While conventional methods require roasting for as long as 120 seconds or more at temperatures of at least about 550 °F, the present invention requires less than a minute (generally about 15-20 seconds) at temperatures within the range of 375 °F to 425 °F. See Arora Decl. ¶ 11.

Yet another unexpected result was the fact that the present invention provided a darker roasted product with milder flavor and less bitterness than conventionally prepared coffee products. This was particularly surprising because dark roasted coffee beans prepared by conventional methods invariably exhibit harsh, bitter and strong flavor notes. The ability of the process of the present invention to decouple roast color and flavor intensity relationship is a unique and unexpected finding allowing a product that is darker in roast color but milder in brew flavor. See Arora Decl. ¶ 12.

In view of all of the foregoing, one of ordinary skill in the art would not reasonably expect that a vortex grinding apparatus, such as described in Polifka, could be used with whole green beans in a process in which green coffee beans are introduced into an enclosure and entrained in the heated air spiraling downward through the enclosure, "wherein at least a portion of the green coffee beans are concurrently dried, roasted to induce pyrolysis, and ground before reaching the lower end" of the enclosure. See Arora Decl. ¶ 13. Accordingly, Applicants respectfully request that this rejection be withdrawn.

**Rejection 2** – Claims 1, 5-10, 13-14, 18-23, 25 and 27-28 have been rejected under 35 U.S.C. §103 as being unpatentable over Polifka, and further in view of and further in view of in view of Enomoto (U.S. Patent No. 5,307,733) and Tidland et al. (U.S. Patent No. 5,598,494) as cited in the Office Action dated October 4, 2006.

The Examiner applied Polifka in the same manner as in Rejection 1. The Examiner relied upon Enomoto to teach a "coffee maker that roasts and grinds coffee beans without the use of separate appliances . . . for the purpose of shortening the length of time required for using freshly ground coffee beans . . ." (citations omitted).

The Examiner relied upon Tidland et al. to provide "a coffee bean roasting apparatus that incorporates a cyclonic air flow (Figure 6) to roast said coffee beans and then exhausting said air through a flue . . . for the purpose of providing a low pollutant and energy efficient roasting system that produces more consistent coffee bean roasts . . ." (citations omitted). The Examiner then concluded that it would have been obvious

"to roast, grind and dry coffee beans as taught by Enomoto and Tidland for the purpose of providing a shorter length of time to make freshly ground coffee beans and to provide a low pollutant and energy efficient roasting system that produces more consistent coffee bean roasts. Such a modification will save the user time and money since a two or three step process can be performed through the purchase of one machine."

Applicants respectfully disagree with this rejection. Applicants do not dispute the significant time and money savings obtainable from a system capable of providing ground roasted coffee in fewer process steps and with less equipment requirements than conventional methods. However, due to the problems discussed above, that need had been unsolved prior to the present Applicants' work. The primary reference Polifka has been discussed above in detail and that discussion is hereby incorporated by reference. As described above, one of ordinary skill in the art would simply not reasonably expect that a vortex grinding apparatus, such as described in Polifka, could be used with whole green beans in a process to provide dried, roasted, and ground coffee beans, in which the dried, roasted and ground coffee beans are obtained from the whole green coffee beans in a single step. Neither Enomoto nor Tidland correct the deficiencies of the primary reference detailed above.

Enomoto teaches a coffee maker having the ability to perform "all of the steps form the roasting of raw coffee beans to the grinding of the beans to the brewing of the coffee completely automatically." The Examiner is correct that the Enomoto device "roasts and grinds coffee beans without the use of separate appliances"; that, however, does **not** mean that the Enomoto device provides a process for concurrently drying, roasting, and grinding green coffee beans in a single unit operation, in which green coffee beans are introduced into an enclosure, and at least a portion of the green coffee beans are **concurrently dried, roasted to induce pyrolysis, and ground in a single unit operation** before reaching a lower end of the enclosure as presently

claimed. Indeed, Enomoto provides a conventional roasting unit 10 in which the coffee beans are roasted. Subsequently, the roasted coffee beans are moved to a holding and cooling chamber 22. After cooling, the roasted and cooled coffee beans are ground in a conventional grinder 30. The ground coffee is then transferred to a conventional brewer device 2 through which hot water is introduced to brew the final coffee beverage. Enomoto is simply a combination of conventional and separate roasting, cooling, grinding, and brewing steps arranged in a single coffee maker. The coffee beans are not concurrently dried, roasted and ground in a single unit operation required by the present claims.

Tidland et al. provides a roasting system having a roasting chamber using heated and reconditioned air to effect roasting. According to the Examiner, Tidland et al. provides "a coffee bean roasting apparatus that incorporates a cyclonic air flow (Figure 6) to roast said coffee beans." Applicants respectfully disagree. The coffee beans in Tidland et al. are roasted in a conventional fluid bed system 36. The so-called "cyclonic air flow" referred to in Figure 6 only relates to the chaff cyclone 60 wherein "reduced air pressure allows the chaff to fall down into funnel 62 [which] directs the chaff into the bucket 64." Col. 5, lines 35-40. Moreover and importantly, there is no grinding of the coffee beans at all in this system, much less in the roasting system. The coffee beans are not concurrently dried, roasted, and ground in a single unit operation as required by the present claims. Applicants respectfully request that this rejection be withdrawn.

**Rejection 3** – Claims 2 and 15 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Polifka, in view of Enomoto and Tidland et al. as applied to claims 1, 5-10, 13-14, 18-23, 25 and 27-28, and further in view of Pultinas (U.S. Patent No. 4,591,508).

The Examiner applied Polifka, Enomoto, and Tidland et al. in the same manner as in Rejection 2. Pultinas Jr. is relied upon to teach "a process for roasting and grinding green coffee beans . . . wherein said processed coffee beans contain [a] moisture content of between 3 and 6 percent" (citations omitted).

The primary reference Polifka and secondary references have been discussed above in detail and that discussion is hereby incorporated by reference. Pultinas Jr.



does not correct the deficiencies of the primary and secondary references detailed above.

Pultinas Jr. does, as indicated by the Examiner, teach a moisture content of the processed coffee of between 3 and 6 percent. However, it is clear that the coffee beans in Pultinas Jr. are roasted and ground in separate steps. Indeed, the grinding itself takes place in a two stage process. In the first stage, the roasted coffee beans are subjected to a coarse grind followed by a second stage wherein the coarse grind is further ground to the desired extent in a roll mill using a range of carefully defined coffee feed rates, roll mill pressures, and roll peripheral surface speeds. The coffee beans are not concurrently dried, roasted, and ground in a single unit operation as required by the present claims. Applicants respectfully request that this rejection be withdrawn.

**Rejection 4** – Claims 3, 4, 11, 16, 17, and 24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Polifka in view of Enomoto and Tidland et al. as applied to claims 1, 5-10, 13-14, 18-23, 25 and 27-28, and further in view of Reeves et al. (U.S. Patent No. 3,821,430).

The Examiner applied Polifka, Enomoto, and Tidland et al. in the same manner as in Rejection 2. Reeves et al. is relied upon with regard to teaching the importance of a particular particle size range.

The primary reference Polifka and secondary references have been discussed above in detail and that discussion is hereby incorporated by reference. Reeves et al. does not correct the deficiencies of the primary and secondary references detailed above.

Reeves et al. provides an instant coffee blend composed of two dissimilarly surface dried coarse granular extracts. The first extract is a quality freeze dried component and the second extract is preferably a lower quality lightly roasted Robusta coffee containing irregularly surfaced agglomerates derived by spray drying and fusion agglomeration. Abstract. There is no teaching or suggestion that coffee beans could be concurrently dried, roasted, and ground in a single unit operation as required by the present claims. Applicants respectfully request that this rejection be withdrawn.

**Rejection 5** – Claims 2-4, 11, 12, 15-17, 24, and 26 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Polifka in view of Enomoto and Tidland et al. as applied to claims 1, 5-10, 13-14, 18-23, 25 and 27-28, and further in view of Ruiz-Avila (International Publication No. WO 00/01256).

The Examiner applied Polifka, Enomoto, and Tidland et al. in the same manner as in Rejection 2. Ruiz-Avila is relied to teach “a method of comminuting . . . and drying plant material using heated air . . . that passes into a conical chamber . . . further comprising an exhaust pipe . . . and a rotary valve . . . for discharging said material” as well as “means for selectively recycling . . . the process material of insufficient particle size” (citations omitted).

Again, the primary reference Polifka and secondary references have been discussed above in detail and that discussion is hereby incorporated by reference. Ruiz-Avila does not correct the deficiencies of the primary and secondary references detailed above.

As shown in Figure 2, Ruiz-Avila provides a low temperature dryer using a cold aerosolizer 34 for drying plant material with air. A cyclone 38 is used to separate air and aerosol from the partially dried plant material. A rotary valve 39 is used at the bottom of the cyclone to remove the partially dried plant material to another drying tower 42 and then to a second cyclone 46 wherein air and the dried plant material are separated. The dried plant material is then removed through rotary valve 47. There is no teaching or suggestion that plant materials such as coffee beans could be concurrently dried, roasted, and ground in a single unit operation as required by the present claims. Applicants respectfully request that this rejection be withdrawn.

**Rejection 6** – Claims 12 and 26 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Polifka in view of Enomoto, Tidland et al., and Reeves et al. as applied to claims 1, 3-11, 13-14, 16-24, 25 and 27-28, and further in view of Eichner (U.S. Patent Publication No. 2004/0142078).

The Examiner applied Polifka, Enomoto, and Tidland et al. in the same manner as in Rejection 2. Eichner is relied to teach certain components of use in a coffee roasting process (e.g., valve to allow discharge of roasted coffee; use of apertures to

release coffee beans; transfer valve with pressure release valve to discharge coffee beans).

Again, the primary reference Polifka and secondary references have been discussed above in detail and that discussion is hereby incorporated by reference. Eichner does not correct the deficiencies of the primary and secondary references detailed above. Eichner is directed to a pressurized roaster for coffee beans. There is no teaching or suggestion that coffee beans could be concurrently dried, roasted, and ground in a single unit operation as required by the present claims. Applicants respectfully request that this rejection be withdrawn.

### **CONCLUSION**

In view of the foregoing, Applicants submit that claims 1-28 are patentable over the cited references and hereby respectfully request reconsideration and allowance of claims 1-28.

The Commissioner is hereby authorized to charge any additional fees which may be required in the Application to Deposit Account No. 06-1135.

Respectfully submitted,

FITCH, EVEN, TABIN & FLANNERY

By: /Sarah M. Walkington/  
Sarah M. Walkington  
Registration No. 55,803

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120 South LaSalle Street, Suite 1600  
Chicago, Illinois 60603-3406  
Telephone 312.577.7000  
Facsimile 312.577.7007